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THE CHEAPEST SOURCE OF INCREASED FOOD SUPPLIES

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AMERICA to-day is seeking every means by which she may increase her agricultural output, and particularly is she concerned in finding those means of increase which will impose the lightest burden upon her supply of labor and of capital. This is the moment's phase of a problem which had begun to vex us seriously in recent years, but which is bound to become vastly more difficult in the future—a condition toward which the present war is a distinctly aggravating force. One solution of the problem is to be found through a choice of crops such that each portion of our land area shall be utilized for the growing of those products for which it is naturally best suited.

We are talking much about thrift now-a-days. Surely no part of the thrift campaign can be more fundamental to our welfare than this which concerns itself with the thrifty or economically effective administration of those natural resources upon which we must depend for the production of the foods, textiles, and other material means of human well-being.

The European colonists who settled our eastern seaboard faced precisely the sort of problem which we are here discussing, viz., the selection for tillage of those crops to which the soil and climate of the new land were best adapted. Naturally the force of inertia was all in the direction of holding them to the cultivation in America of the slender list of staples which made up the bulk of the output of western Europe at the time. But in terms of soil and climate America was a far jump from the mother lands and, after a few early disasters, considerable changes were effected in the old farm practise. Taking counsel from the Indian, the settlers adopted maize and found in it a much more powerful ally in conquering the new lands than they had possessed in any of their accustomed cereals. In potatoes, both the sweet and the miscalled "Irish" varieties, they found a cheaper source of starchy food than from any product of their previous acquaintance. Of non-food articles, tobacco and cotton early established themselves in high esteem.

When the great army of American pioneer farmers poured across the mountains to take up our agricultural domain they undertook to raise only the proved staples of their colonial predecessors and to do it by a simple system of extensive field culture. This was inevitable in view of the fact that they were pioneers going out to prove up on the land, not settled husbandmen expecting to bring it to its final condition of utilization. They dropped silk and linen from their wearing apparel and most of the delicacies from their diet. Little even of pleasing variety was left. But in the half dozen staple products they had what might be called the primary colors both of a diet and of a farm system. They had fat, starch and protein, and they had a few well-chosen crops with which to subdue virgin lands and lay the solid foundation of an enduring agriculture. But in neither case did they have the full spectrum. Their products were not capable of supplying the normal human desire for varied food or textiles, nor of catching or utilizing the varied productive power of different soils and climates. It is left to the modern day to produce the full rainbow of that achievement. And that is the point which I am driving at.

Possibly it can best be illustrated by giving something of a chronological account of the development of our resources as it has actually taken place. Whether we look north or south, east or west, we see very clearly that the process has been one of carving out the great chunks of territory suitable for certain staple products—the cotton belt, the corn belt, the wheat region. If you follow the main track of the pioneers you will walk over smooth prairies and fertile plains. While some hard labor was spent upon improving the hillsides of the northern colonies in early times it was south along the broader coastal plain that agriculture flourished and cotton plantations and tobacco fields expanded. And when the land chosen for this particular sort of crops was full, resort was not taken to land of other character by using it for other products. No, the tobacco fields of Virginia were repeated in the limestone soil of Kentucky and the cotton fields of the Carolinas and Georgia were followed by cotton fields of a like character culled out from among the varied resources of Alabama, Mississippi, Louisiana, Arkansas, and finally the black prairies of Texas.

Not less did northern agriculture push westward with its slender range of crops and its fastidious selection of lands naturally suited to their growth. The Genesee Valley of western New York, then Ohio, the greaat Northwest Territory, the Missouri Valley, and the Red River Valley of the North were stages in the journey. The march of corn was stopped at a dry frontier on the west and a frost line at the north, but wheat found new provinces to conquer in the San Joaquin, the Inland Empire of Washington, Montana, and the Canadian Northwest. In general, the pioneer sidestepped the wet lands, the dry lands, and the rough lands. To him they were poor lands, even worthless lands. He had no need to be thrifty about land, for there was always plenty of it—in fact, too much.

But now the point of view has changed. We are close upon the limit of our resources and asking where we shall find more land with which to supply our ever-growing needs. And the answer is, by finding out what productive qualities exist in the acres which have been discarded in this early reconnaissance development of our country and, by suitable means, drawing out the full measure of this productive power. In not a few instances it appears likely that the stone rejected of the builders may become the head of the corner.

With the reclamation of her arid and swamp lands America has of late years become much concerned. Such endeavors, however, should consist not alone of dams and ditches and dredging operations. Sometimes in lieu of such works and sometimes supplementing them should go a wise choice of drought-resistant or of water-tolerant crops. The pioneer with his moist-land crops and his moist-land methods was baffled when he reached the subhumid zone in his westward advance. After one disastrous attempt he admitted defeat and withdrew, leaving the land beyond the 100th meridian as waste land and his primitive sod house as the monument of his ill judgment. But the "dry-farmer" has refused to let all those fertile acres go untouched when markets offer a good price for grain and fodder and meat. Hence he has reformed his tillage methods so as to conserve all the moisture possible. But furthermore he has chosen a different set of plants to help him, turning from the hard drinkers to a group of more abstemious habits, able to do their bit on 15, 20, or perhaps 25 inches of rainfall instead of 30, 35, or even 40. He has turned to durum wheat and milo maize, kafir corn, kaoliang, and the whole group of non-saccharine sorghums. And he has found in alfalfa perhaps the best of all the dry-land crops, not so much because it *wants* only little moisture but because of the fact that it *can do* with relatively little and will work for all it gets. Given much water, it will yield heavily and often, but, planted where rainfall is scarce, it will delve deep to bring up all there is in a 15-foot layer of the soil and thus yield one or at most two cuttings on the subhumid land.

Much work has been done in recent years, as we have begun to see the value of these lands, so good in all but one particular, to find the crop by which at least a portion of their potential productivity might be realized. Scientific explorers of the Department of Agriculture since 1898 have searched far and wide to find whatever kind of plant life had been evolved by nature or developed by man to fit such conditions elsewhere as we face in America. Professor Hansen went back to the motherland of alfalfa in Turkestan to find in the driest habitat the most drought-resistant strain of the plant. We have gone to Arabia for the date palm, to Africa for kafir, Manchuria for kaoliang, but have not forgotten that for sheer "bone-dryness" our own cacti beat them all.

If we turn now to the question of wet lands it is evident, if one reads the history of the pioneers, that a very large part of our country was in its native state too wet for the plants with which the European settler was familiar. There are perhaps two reasons why this problem may strike one less forcibly than that of the arid lands. First, because the wet areas were, in general, smaller scattered patches, nothing so spectacular as our "Great American Desert" and also because a readier means of reclamation was at hand in even crude methods of drainage. But from the slough-holes of the glaciated North to the alluvial river bottoms of the South there are probably 80,000,000 acres of land—an area three times the size of Great Britain and Ireland—now useless because too wet. Most of this can be made productive only by the installation of drainage works, but it should be remembered that even so a wise selection of crops is necessary if the drained land is to be successfully utilized. For drainage removes the surplus water; it does not prevent flooding, and many soils, even when drained, are still of such a character as to be suitable only for special crops—rice, celery, cranberries, onions; not for the old stand-bys, corn, oats, wheat, hay and cotton.

Kalamazoo celery, Wisconsin cranberries, the onions from Iowa muck lands—not to mention peppermint and spearmint—are, I suppose, fairly familiar, but doubtless many people are not yet aware that within the last few years the South has begun to turn some of her over-moist lands to the raising of certain species of aroid—a subtropical root crop which thrives in wet environments. Most important is the dasheen, first cousin to the "elephant-ear" of your parks, its leaves a salad plant, its stems a vegetable surpassing asparagus, its tuberous roots a good substitute for potatoes and claimed to make a flour better than wheat. Not mine to boast of the dasheen, but it does appear to hold out much hope for profitable utilization of lands in the Southeast with 50 to 70 inches of rainfall. It is now grown and milled commercially and in increasing amount.

One of the neatest illustrations of learning how to play one's hand in a wet country so that the surplus moisture takes the odd trick instead of losing the whole game was recently furnished by a small community in central Arkansas. These farmers had been following the conventional type of agriculture of the region —cotton and corn. But nearly every spring the River Petit Jean covered the fields with back water for a short time. So, while the soil of this section was good and the climate all that could be desired for most of the season, yet returns were poor because of a short period of submergence early in the growing season. Neither young cotton nor corn can bear to have their feet wet.

Levees are expensive and not altogether trustworthy; so two young men who owned a farm thought they would try to use the river instead of fighting it. They decided to ally themselves with a crop that could stand flooding, in fact that required it—rice. To this use their "buckshot" soil was quite as well adapted as for cotton and corn, and the river offers a cheap and abundant source of water supply for the later portions of the growing season. This shrewd choice of a crop has brought instant attainment of the potential productiveness of a section which would otherwise have remained a precarious venture in crop-making or have required the expenditure of much time and money before it would have been rendered suitable for corn and cotton. At the same time society would have been losing a valuable resource, for the lands which, by reason of soil, topography, climate and water-supply, are capable of producing rice are relatively rare, whereas corn and cotton thrive over very wide areas.

It would be wearisome to attempt to go into all the many kinds of agricultural unfitness which may be overcome by the judicious choice and adaptation of farming enterprises. The West has great stretches of lands which are alkaline—an infirmity which is frequently aggravated by the introduction of irrigation, but which may be combated by the use of alkali-resistant crops. In this group the sugar-beet has proved itself one of the best, though cotton bids fair to prove a worthy rival in the warmer portions of the alkali zone. Barley is probably the most successful representative of the small grains, and there is a fairly good list of forage plants, which—praise Allah!—includes a number of the legumes. For extreme conditions we have the ubiquitous cactus, now happily de-spined, and perhaps ultimately the Australian salt-bush.

Likewise the problem of sandy land has baffled many a cultivator accustomed to the technique of loam and clay. Even in the time when the colonists were belaboring the barren hillsides of New England they were not enough humbled to try the sandy barrens of New Jersey. But the modern truck and fruit grower is not too proud to fight for even such unpromising resources. The light soil is easily worked and, for such products as are made up mainly of water and a little sugar, is tolerably productive. Not only in New Jersey, but in practically every state in the South, fortunes are being drawn from such lands through the medium of berries, melons, peaches and numerous varieties of fancy vegetables.

But of all the agricultural Cinderellas, none presents more engaging possibilities than those offered by the hill lands. Probably we have not yet come as close to a sensible mode of using such resources as in the case of most other types of land. Certainly it would seem that it was in this field that the most egregious blunders have been made in the past, for flat-land agriculture *can* be carried on to the hills and persisted in (to the harm of the land and the impoverishment of the worker), whereas Nature more sternly turns men back from land too wet or too dry. We know that the hills of New England were pressed into flat-land uses by reason of certain peculiar circumstances and with most melancholy results. And in every other hill section—Appalachian, Ozark, or wherever—we find either that the early settler turned his back upon the hills or else essayed to raise his valley crops instead of devising a hill technique really suited to the circumstances. Hence the backward and unprosperous hill folk.

Allow me to illustrate this point from a situation with which I am somewhat familiar, the Ozark hills of northwest Arkansas. The first rush of land exploitation flowed to the north and south of this region. Grain farming took up the region to the north; the cotton planters, as has already been mentioned, swept through as far as Texas on the south, cutting out the most suitable cotton lands and spreading up the valley of the Mississippi, the Arkansas, the Red River, and the White. When Oklahoma was opened up, the wheat belt spread downward from Kansas and the cotton belt spread upward from Texas till the main stream of pioneer agriculture flowed together on our west, leaving the Ozarks an island of land ill suited to the uses of a pioneering people. This is not to say that the region was a desert or unpopulated. But in general the population which did come into this territory tried simply to carry the crop practises of the flat land up into the hills—and with sorry results, indeed. Though things have largely changed to-day, one may still ride through certain sections and see a native farmer or his wife following a "littie ole rabbit mule" and an eight-inch plow up and down over stony hillsides, which it was a crime even to have cleared. To try and force corn, the small grains (they are cut with a cradle), and cotton from such land is the most thriftless of all ways of employing nature's resources and the labor of human beings. But those very hills are a fine old residual limestone formation, the soil beloved of alfalfa and many of the nitrogen-gathering legumes. It is suited too to raising the finest of peaches and apples and strawberries. The wooded hills furnish splendid pasturage for cattle and hogs and the small creek bottoms will produce an adequate supply of grain and forage for the short winter season. As soon as man makes the nature of the soil and topography his point of departure and not the habits of his past he can fit upon the resources of this region a splendid type of diversified farming, producing a good living to the farm family and salable specialties of a high order.

Similar conditions have existed in the mountain region of the Appalachians and Northeast. The fertile Shenandoah was praised, and backs were turned upon the rough Piedmont sections of Virginia. But to-day the Albermarle pippin and a host of other good fruits, not to mention superior livestock, make the Piedmont a fair rival of her haughty elder sister. So of sheep-raising and horse-breeding on the hillsides of Vermont and New Hampshire, which were once insanely belabored to produce wheat; peaches in the rocky lands of Connecticut, and fruit and butter from the broken portions of New York.

Now all these are well and permit of establishing a prosperous agriculture upon even hilly lands. But they are only the beginning, for as soon as slopes become very steep or the land very much broken even standard methods of orchard cultivation are precluded, and we must fall back practically upon forest conditions, but with the chance for more than a forest product. Here it becomes a matter of selecting tree crops of great value. The Italian gets a cheap substitute for butter from his olive trees and, while we may not alter our habits of consumption to effect such an economy, we have already a substantial olive industry in California. And the high food values of various nuts have been practically ignored in the United States. The pioneer used such products because of stern necessity, but the American farmer has been so intent upon the conventional crops as to think little of the possibilities of nut culture upon those parts of his farm ill-suited to plow methods.

Likewise, he has done no more than passively accept from the persimmon a portion of its spontaneous product, but this is in fact a fruit of considerable economic value and readily capable of improvement. The Department of Agriculture has introduced the large Japanese and Chinese persimmon and they offer a highly promising field of development in the future. From China also has come the Tung-oil tree, capable of producing one of the finest painters' oils from lands otherwise yielding products of small value. Spain is the seat of an important cork industry, but experiments have shown that the cork-oak can be grown upon our own rough lands. And bamboo also presents future possibilities.

And so on indefinitely. The land which was spurned, and very properly so, in the days of our agricultural development can not be unthriftily left in idleness in the coming days when we shall press more heavily upon our natural resources for subsistence. In some cases it is doubtless best to go to the expense needful to render such lands suitable to the products we have been accustomed to raise. In others it can not be done or, if at all, only at too great an outlay. Within the limits set by our tastes (and many of them can be re-educated) it is most economical to humor Madame Nature, to let her produce those things for which she shows a preference or for whose production she is already equipped.

Such an issue of expediency presses itself upon our consideration peculiarly amidst the exigencies already confronting us as a result of war conditions or presaged by after-war forebodings. Capital is being destroyed at an unprecedented rate, and men are being killed and maimed in numbers that can not soon be replaced. And it was upon more man power and larger outlays of capital that all our plans of an enlarging agricultural product were being based. The men and money which might have gone to build great irrigation and drainage works or to furnish the labor, the tractive power, the farm implements, and the fertilizers for a more intensive agriculture are fast being spent upon the battlefields of Europe. How then shall we hope to augment production at the very time when these productive factors are being squandered in a tragic enterprise elsewhere? Through shifting the burden, by every ounce we can, upon that third great member of the economic partnership—Nature; by so adapting our culture as to utilize our natural resources at the peak of their effectiveness; by choosing crops that catch step with Nature's spontaneous endeavors. And what is good policy for war time will be no less effective in adding to our welfare in times of peace.